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rather than difficulty." For more than ten years Professor Bailey has been moving in the direction of this cyclopedia, much of his published work in the meantime being "material on the way" to the larger venture. The "Annals of Horticulture," published for five years, was the first tangible result, "designed to be a witness of passing events and a record of progress."

To compile a cyclopedia by using other cyclopedias involves drudgery, but presents no special difficulties, and results in no special merits. In Bailey's *Cyclopedia,* however, the work is new from start to finish, both in text and illustrations, and the list of collaborators shows that the most expert assistance has been obtained.

The illustrations, too, deserve special mention for the happy combination of scientific and artistic excellence, and it has been one of the rules of the "make up" that "wherever the book opens an engraving will be seen." Besides, the book is distinctly American in its flavor, fully setting forth American experience and conditions.

The matter may be arranged under three heads: cultural, taxonomic, and morphological, and the sequence seems to express their relative importance, as "the stress is laid upon the plants as domesticated and cultivated subjects."

In reference to the cultural parts the reviewer can express no opinion, but botanists are familiar with Professor Bailey's standard in such matters, and need no assurance as to the freshness and vigor of this portion of the work.

The following example, under the title *Acacia,* will serve to illustrate the taxonomic portion of the work. The genus is described briefly, in language as non-technical as possible, and a synopsis of fifty-three species is given, including all those in the American trade. The synopsis consists of an analytical key, brief descriptions, and essential synonymy, just as in an ordinary manual, so that the *Cyclopedia* becomes a great manual for all plants in cultivation in America.

The morphological titles, such as "flower," etc., are to appear chiefly in subsequent volumes, and comment on this topic will be deferred.

To the botanist the *Cyclopedia* is a mass of most valuable information, bringing together, as it does, into available and properly edited form, the immense contribution of facts from horticulturists to the whole evolutionary doctrine, and enabling the morphologist to know what form he is handling and what has been done with it. The work should find its place in the libraries of all botanical laboratories as well as in those of practical horticulturists.—J. M. C.

Minnesota plant life.

FOR the second time botanists have had the pleasure of seeing a book that has for its topic the vegetation of one of our states. Pound and Clements'

Phytogeography of Nebraska was a work that marked a distinct advance in the ecological investigation of our country. MacMillan has now given us an attractive presentation of the plant life of Minnesota.[2] The purpose of this work, however, is different from that of the earlier one. Its style is less technical and the pages abound in illustrations. The author distinctly states that his purpose is the botanical education of the people of Minnesota, not through the use of the book as a text, but rather through its intelligent perusal by the wide-awake boys and girls of the state. The author remarks that the book is more the offspring of the woods and lakes than of the laboratory and library. The work, then, is to be judged from the standpoint of the people rather than from the standpoint of the botanist, although Professor MacMillan endeavors to make the book scientific as well as popular.

The introductory chapter deals with the relation of the Minnesota flora to that of the whole country, and the author gives a brief discussion of the forest and prairie with their lines of tension. Then follows a chapter on the wanderings and migrations of plants. Most of the book (390 out of 525 pages) is taken up with a popular and readable description of the plants of the state, beginning with the slime-molds and closing with the composites. Common names are given in most instances, even if they have to be introduced for the occasion, as in the case of many of the lower forms. The cryptogams are given great prominence, and are well illustrated by a number of excellent half tones. The feature of this part of the work is the untechnical description of the various species. In most cases the ecological and economic relations of the plants are most fully treated, as they should be in a work of this kind. More technical chapters are also introduced for those who are interested in the philosophy of the subject ; such chapters are those that deal with alternation of generations and the meaning of the seed habit.

The latter part of the book is distinctly ecological, treating the adaptations of plants to their surroundings and also the plant societies in the familiar way. The last two chapters are physiological, dealing with nutrition and reproduction.

This work does not pretend to be an addition to science, although many of the photographs may be regarded as contributions along this line. The wealth of illustration is one of the strongest features of the book and it is doubtless superior in this regard to any work that has yet appeared in America. Not only are the illustrations numerous, but they show what they are said to show, which is not true of all illustrated books. The style is very attractive and must appeal not only to the botanical reader but to all who have a love for nature. The book abounds in catchy phrases and presents plants almost as though they were human. One result of the study of this book ought to be a more widespread recognition of plants as living things, which have rights to be respected.

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[2] MACMILLAN, CONWAY : Minnesota Plant Life. Report of the Survey, Botanical Series III. Imp. 8vo. pp. xxv + 568. *pl. 4. figs. 240.* St. Paul, Minn.: Published by authority of the Board of Regents of the University for the People of Minnesota. 1899.

Adverse criticisms upon *Minnesota Plant Life* are few, and are mainly incident to the popularization of a scientific subject. However, it is very doubtful whether a book of this character is the place in which to exploit such ideas as these: peat bog plants have xerophytic structures so as to prevent the rapid passage of water through the tissues (p. 436); the inclusion of salvinias and bladderworts under the term plankton (p. 443); extreme views on the significance of colors, in which blue as well as red is called a "warming-up" color, so that blue and red flowers are said to come from northern climes and yellow flowers from warmer climes, and that spring and fall flowers are blue or red, while summer flowers are yellow (p. 426); vernal plants are said to have come from the north, and the more leisurely plants from the south; sunflowers and their allies are the highest of the plants and may form the forests of the future (p. 471). All of these ideas are extremely fanciful, if not untrue. They may properly have a place in poetry and in the graduate classes in ecology; but the popular mind is already too full of such ideas, and it seems a pity that botanists should further encourage this kind of thinking by using it in popular works.—HENRY C. COWLES.

A popular treatise on bacteria.

IN ONE of the recent volumes of the Science series the author, Mr. George Newman, attempts "to set forth a popular scientific statement of our present knowledge of bacteria."[3] The following are the principal topics discussed: the biology of bacteria; the bacteria of water, air, and soil; bacteria in milk and other foods; bacteria in fermentation; immunity and antitoxins; bacteria and disease; and disinfection. This list of subjects is an attractive one. The literary style is easy and in many ways the book seems to possess those qualifications which will assure for it a ready sale.

Books on popular science, especially if pleasing in style and manufacture, reach a vast number of readers and form a very important educational factor. Often a single book is the only treatise upon a given subject that falls into the hands of the reader. In such instances the book stands as an "authority" in the reader's mind. Because of this exalted position, which may be reached by the popular treatise with or without good reason, such books may properly be subjected to even more searching criticism than are more abstruse texts.

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[3] NEWMAN, GEORGE: Bacteria, especially as they are related to the economy of nature, to industrial processes, and to the public health. 8vo. pp. xiv + 348; *illus.* New York and London: G. P. Putnam's Sons. 1899.